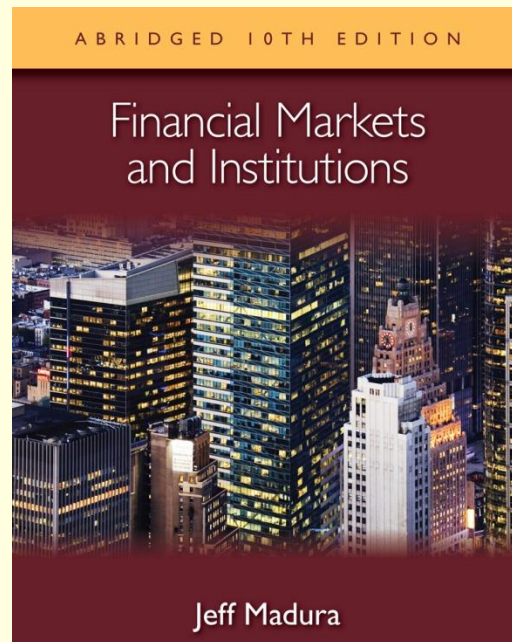


Financial Markets and Institutions

Abridged 10th Edition

by Jeff Madura



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16 Foreign Exchange Derivatives Market

Chapter Objectives

- provide a background on foreign exchange markets
- explain how various factors affect exchange rates
- explain how to forecast exchange rates
- describe the use of foreign exchange rate derivatives
- explain international arbitrage

Foreign Exchange Markets

- Foreign exchange markets are a global telecommunications network among the large commercial banks that serve as financial intermediaries.
- The price at which banks will buy a currency (**bid price**) is lower than the price at which they will sell it (**ask price**).

Institutional Use of Foreign Exchange Markets

- The degree of international investment by financial institutions is influenced by potential return, risk, and government regulations.

Foreign Exchange Markets

Exchange Rate Quotations

The **direct exchange rate** specifies the value of a currency in U.S. dollars.

The **indirect exchange rate** specifies the number of units of a currency equal to a U.S. dollar

- **Forward Rate** - The rate at which a currency can be exchanged in the future.
- **Cross-Exchange Rates** – The exchange rate between two nondollar currencies.

Exhibit 16.1 Institutional Use of Foreign Exchange Markets

TYPE OF FINANCIAL INSTITUTION	USES OF FOREIGN EXCHANGE MARKETS
Commercial banks	<ul style="list-style-type: none"> • Serve as financial intermediaries in the foreign exchange market by buying or selling currencies to accommodate customers. • Speculate on foreign currency movements by taking long positions in some currencies and short positions in others. • Provide forward contracts to customers. • Some commercial banks offer currency options to customers; unlike the standardized currency options traded on an exchange, these options can be tailored to a customer's specific needs.
International mutual funds	<ul style="list-style-type: none"> • Use foreign exchange markets to exchange currencies when reconstructing their portfolios. • Use foreign exchange derivatives to hedge a portion of their exposure.
Brokerage firms and securities firms	<ul style="list-style-type: none"> • Some brokerage firms and securities firms engage in foreign security transactions for their customers or for their own accounts.
Insurance companies	<ul style="list-style-type: none"> • Use foreign exchange markets when exchanging currencies for their international operations. • Use foreign exchange markets when purchasing foreign securities for their investment portfolios or when selling foreign securities. • Use foreign exchange derivatives to hedge a portion of their exposure.
Pension funds	<ul style="list-style-type: none"> • Require foreign exchange of currencies when investing in foreign securities for their stock or bond portfolios. • Use foreign exchange derivatives to hedge a portion of their exposure.

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Foreign Exchange Markets

Types of Exchange Rate Systems

- **Bretton Woods era (1944-1971):** the exchange rate was maintained by governments within 1 percent of a specified rate.
- **Smithsonian Agreement (1971):** allowed for devaluation of the dollar and called for a widening of boundaries from 1 to 2 ¼ percent.
- **Floating exchange rates (1973)**
 - **Dirty float:** exchange rates are market determined but subject to some government intervention.
 - **Freely floating system:** foreign exchange market is totally free from government intervention.

Types of Exchange Rate Systems

■ Pegged Exchange Rate System

- Some currencies may be pegged to another currency or a unit of account.
- A country that pegs its currency does not have complete control over its interest rates.

Foreign Exchange Markets

- In 1999, **the euro** replaced 11 national currencies in Europe.
- The countries that participate in the euro make up a region called **the eurozone**.
- Since all of these countries use the same currency, transactions between them do not require any exchange of currencies.

Eurozone Monetary Policy

- The European Central Bank (ECB) is responsible for setting monetary policy for all countries in the eurozone.
- The bank's objective is to maintain price stability (control inflation) in these countries, as it believes that price stability is necessary to achieve economic growth.

Factors Affecting Exchange Rates

- In equilibrium, there is no excess or deficiency of a currency.
 - Demand for European leads to demand for the euro. If demand for the euro exceeds supply, the euro will **appreciate**.
- A currency's **supply and demand** are influenced by:
 1. Differential inflation rates
 2. Differential interest rates
 3. Government (central bank) intervention

Factors Affecting Exchange Rates

Differential Inflation Rates

- **Purchasing power parity (PPP)** suggests that the exchange rate will, on average, change by a percentage that reflects the inflation differential between the two countries of concern.
- In reality, exchange rates do not always change as suggested by the PPP theory. Other factors that influence exchange rates can distort the PPP relationship.

Factors Affecting Exchange Rates

Differential Interest Rates

- Interest rate movements affect exchange rates by influencing the capital flows between countries.

Factors Affecting Exchange Rates

Central Bank Intervention - Central banks can adjust a currency's value to influence economic conditions.

- **Direct Intervention** - Occurs when a country's central bank sells some of its currency reserves for a different currency.
- **Indirect Intervention** - The Fed can affect the dollar's value indirectly by influencing the factors that determine its value.

Factors Affecting Exchange Rates

Central Bank Intervention (Cont.)

■ Indirect Intervention during the Peso Crisis

In 1994, Mexico experienced a large balance of trade deficit and on December 20, 1994, Mexico's central bank devalued the peso by about 13 percent and increased interest rates to discourage investors from withdrawing their investments.

■ Indirect Intervention during the Asian Crisis

In 1997, many Asian countries experienced weak economies and their banks suffered from substantial defaults. Some countries (e.g., Thailand and Malaysia) increased their interest rates as a form of indirect intervention to encourage investors to leave their funds in Asia.

Factors Affecting Exchange Rates

Central Bank Intervention (Cont.)

■ Indirect Intervention during the Russian Crisis

May 1998, over a four month period, the Russian currency (the ruble) had consistently declined and stock market prices had declined by more than 50 percent. The Russian central bank attempted to minimize such outflows by tripling interest rates

■ Indirect Intervention during the Greek Crisis

In 2010, Greece experienced weak economic conditions and a large increase in its government budget deficit. The ECB responded with a stimulative monetary policy that was intended to keep interest rates low.

Forecasting Exchange Rates

Forecasting techniques can be classified as:

- Technical forecasting
- Fundamental forecasting
- Market-based forecasting
- Mixed forecasting

Forecasting Exchange Rates

Technical Forecasting

- Involves the use of historical exchange rate data to predict future values.
- A computer program can be developed to detect particular historical trends.
- There are also several **time-series models** that examine moving averages and thus allow a forecaster to identify patterns, such as currency tending to decline in value after a rise in moving average over three consecutive periods.

Forecasting Exchange Rates

Fundamental Forecasting

- Based on fundamental relationships between economic variables and exchange rates.
- Given current values of these variables along with their historical impact on a currency's value, corporations can develop exchange rate projections.

Forecasting Exchange Rates

Market-Based Forecasting: The process of developing forecasts from market indicators, is usually based on either the spot rate or the forward rate.

- **Use of the Spot Rate** - corporations can use the spot rate to forecast because it represents the market's expectation of the spot rate in the near future.
- **Use of the Forward Rate** - Speculators would take positions if there were a large discrepancy between the forward rate and expectations of the future spot rate.

Mixed Forecasting: Some MNCs use a combination of forecasting techniques.

Foreign Exchange Derivatives

- **Forward contracts** are typically negotiated with a commercial bank and allow the purchase or sale of a specified amount of a particular foreign currency at a specified exchange rate (the forward rate) on a specified future date.
- The **forward market** is a telecommunications network where large commercial banks match participants who wish to buy and sell.
- Many of the commercial banks that offer foreign exchange on a spot basis also offer forward transactions for widely traded currencies.

Foreign Exchange Derivatives

Estimating the Forward Premium

$$p = \frac{FR - S}{S} \times \frac{360}{n}$$

Where:

p	=	Forward Rate Premium
FR	=	Forward Rate
S	=	Spot Rate
n	=	number of days forward rate

Foreign Exchange Derivatives

Currency Futures Contracts

- Standardized contracts that specify an amount of a particular currency to be exchanged on a specified date and at a specified exchange rate.
- A firm can purchase a futures contract to hedge payables in a foreign currency by locking in the price at which it could purchase that specific currency at a particular point in time.

Currency Swaps

- Agreements that allow one currency to be periodically swapped for another at specified exchange rates.

Currency Options Contracts

- Primary advantage over forward and futures contracts is that the parties have the **right but not the obligation** to purchase or sell a particular currency at a specified price within a given period.
- A **currency call option** provides the right to purchase a particular currency at the exercise price within a specified period.
- A **put option** provides the right to sell a particular currency at the exercise price within a specified period.

Foreign Exchange Derivatives

Use of Foreign Exchange Derivatives for Hedging

- If the firm requires a tailor-made hedge that cannot be matched by existing futures contracts, a forward contract may be preferred. Otherwise, forward and futures contracts should generate similar results.
- The firm must choose between an obligation type of contract (forward or future) an options contract.

Foreign Exchange Derivatives

Use of Foreign Exchange Derivatives for Speculating

- If a currency is expected to **appreciate**, a speculator could:
 - Purchase the currency forward, and when it is received, then sell it in the spot market.
 - Purchase futures contracts on the currency, and when the currency is received, sell it in the spot market.
 - Purchase call options on the currency, and if the spot rate exceeds the exercise price, then exercise the option and sell the currency in the spot market.

Foreign Exchange Derivatives

Use of Foreign Exchange Derivatives for Speculating

- If a currency is expected to **depreciate**, a speculator could:
 - Sell the currency forward, and purchase it in the spot market just before fulfilling the forward obligation.
 - Sell futures contracts on the currency, and then buy it in the spot market just before fulfilling the futures obligation.
 - Purchase put options on the currency, and if the spot rate is less than the exercise price, then purchase the currency in the spot market and exercise the option.

Foreign Exchange Derivatives

Use of Foreign Exchange Derivatives for Speculating

■ Speculating with Currency Futures

- If the future spot rate is expected to be higher than the futures price, a firm could buy currency futures.
- The risk of this speculative strategy is that the currency may decline rather than increase in value.

■ Speculating with Currency Options

- The risk is that the does not appreciate or depreciate as expected, and the loss will be the premium paid for the option.

Exhibit 16.2 Estimating Speculative Gains from Options Using a Probability Distribution

(1)	(2)	(3)	(4)	(5)	(6)
POSSIBLE OUTCOME FOR FUTURE SPOT RATE	PROBABILITY	WILL THE OPTION BE EXERCISED BASED ON THIS OUTCOME?	GAIN PER UNIT FROM EXERCISING OPTION	PREMIUM PAID PER UNIT FOR THE OPTION	NET GAIN OR LOSS PER UNIT
\$1.50	10%	No	—	\$.03	–\$.03
1.59	20	Yes	\$.02	.03	–.01
1.63	50	Yes	.06	.03	.03
1.66	20	Yes	.09	.03	.06

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International Arbitrage

Locational Arbitrage

- The act of capitalizing on a discrepancy between the spot exchange rate at two different locations by purchasing the currency where it is priced low and selling it where it is priced high.

Triangular Arbitrage

- Involves buying or selling the currency that is subject to a mispriced cross-exchange rate.

Exhibit 16.3 Bank Quotes Used for Locational Arbitrage Example

	BID RATE ON EUROS	ASK RATE ON EUROS
Sacramento Bank	\$1.050	\$1.056
Baltimore Bank	\$1.042	\$1.046

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Covered Interest Arbitrage

The coexistence of international money markets and forward markets forces a special relationship, between a forward rate premium and the interest rate differential of two countries, that is known as **interest rate parity**.

$$p = \frac{(1 + i_h)}{(1 + i_f)} - 1$$

where

p = forward premium of foreign currency

i_h = home country interest rate

i_f = foreign interest rate

SUMMARY

- Exchange rate systems vary in the degree to which a country's central bank controls its currency's exchange rate. Many countries allow their currency to float yet periodically engage in intervention to control the exchange rate. Some countries use a pegged exchange rate system in which the currency's value is pegged to the U.S. dollar or to another currency. Several European countries have adopted the euro as their currency, and a single monetary policy is implemented in those countries.

SUMMARY (Cont.)

- Exchange rates are influenced by differential inflation rates, differential interest rates, and central bank intervention. There is upward pressure on a foreign currency's value when its home country has relatively low inflation or relatively high interest rates. Central banks can place upward pressure on a currency by purchasing that currency in the foreign exchange markets (by exchanging other currencies held in reserve for that currency). Alternatively, they can place downward pressure on a currency by selling that currency in the foreign exchange markets in exchange for other currencies.
- Exchange rates can be forecasted using technical, fundamental, and market-based methods. Each method has its own advantages and limitations.

SUMMARY (Cont.)

- Foreign exchange derivatives include forward contracts, currency futures contracts, currency swaps, and currency options contracts. Forward contracts can be purchased to hedge future payables or be sold to hedge future receivables in a foreign currency. Currency futures contracts can be used in a manner similar to forward contracts to hedge payables or receivables in a foreign currency. Currency swaps can be used to lock in the exchange rate of a foreign currency to be received or purchased in the future. Currency call (put) options can be purchased to hedge future payables (receivables) in a foreign currency. Currency options offer more flexibility than the other foreign exchange derivatives, but a premium must be paid for them. Foreign exchange derivatives can also be used to speculate on expected exchange rate movements. When speculators expect a foreign currency to appreciate, they can lock in the exchange rate at which they may purchase that currency by purchasing forward contracts, futures contracts, or call options on that currency. When speculators expect a currency to depreciate, they can lock in the exchange rate at which they may sell that currency by selling forward contracts or futures contracts on that currency. They could also purchase put options on that currency.

SUMMARY (Cont.)

- International arbitrage ensures that foreign exchange market prices are set properly. If exchange rates vary among the banks that serve the foreign exchange market, locational arbitrage will be possible. Foreign exchange market participants will purchase a currency at the bank with a low quote and sell it to another bank where the quote is higher. If a quoted cross exchange rate is misaligned with the corresponding exchange rates, triangular arbitrage will be possible. This involves buying or selling the currency that is subject to the mispriced exchange rate. If the interest rate differential is not offset by the forward rate premium (as suggested by interest rate parity), covered interest arbitrage will be possible. This involves investing in a foreign currency and simultaneously selling the currency forward. Arbitrage will occur until interest rate parity is restored.